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Inquiry
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Commission, 1922-1924

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HYDRO ELECTRIC ENQUIRY COMMISSION

QUEENSTON - CHIPPAWA

Estimates and Appropriations

TORONTO, APRIL 4TH, 1923.

W. C. Coo
Official Reporter



HYDRO-ELECTRIC INQUIRY COMMISSION.

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1801. 10. 10. Wrote to Mr. Johnson, Esq. in Boston, beloved, expressing
my satisfaction at his conduct, and
expressed my desire to have him
appointed to represent me in
Boston.

1801. 10. 11. Went over back to Boston and
to New York again, from
Adams at Boston, and
arrived at New York.

1801. 10. 12. Arrived in New York, and
had a talk with Mr. Johnson
about my business.

1801. 10. 13. Spent the day in New York
and Boston, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 14. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 15. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 16. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 17. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 18. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 19. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 20. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 21. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

1801. 10. 22. Spent the day in Boston
and New York, and then
had a talk with Mr. Johnson
about my business.

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HYDRO - ELECTRIC INQUIRY COMMISSION.

TORONTO, APRIL 4th, 1923. 3.25 p.m.

P r e s e n t :

W. D. GREGORY, ESQ., CHAIRMAN.

M. J. HANEY, ESQ., COMMISSIONER.

R. A. ROSS, ESQ., COMMISSIONER.

J. A. ROSS, ESQ., COMMISSIONER.

J. H. W. BOWER, ESQ., SECRETARY.

QUEENSTON - CHIPAWA.

BESTIMATES AND APPROPRIATIONS.

HON. N. W. ROWELL, K.C., Counsel for the Commission.

J. B. ALLEN, ESQ.

HON. I. B. LUCAS, K.C.

F. A. GABY, ESQ., Chief Engineer.

N. W. POPE, ESQ., K.C., Secretary of the Hydro Commission, and

H.C. ACRES, ESQ., Representing the Hydro Electric Commission.

F. A. GABY: Re-Called. Examined by HON. MR. ROWELL.

Q--You have a list before you, tell us which questions you have information with reference to ?

A--No. 16 is the first one I have before me and I will have to go over that in detail. It is not quite full enough to answer your No.1 question as it is; that is a comparison of totals between the Kerbaugh estimate and the \$65,000,000 estimate. You will appreciate I have not had an opportunity to look at these things and I only have just what the staff has got ready for me to enable me to answer these questions.

Q--I want to see what you have got first; tell me what you have there ? A--No.16 you ask I understand it, for an

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Hlote wdt s. de tant wwt yllo L. þan twelft secundis Hlote
lētferit secund twelft of ea alderas or on not ghean hig and
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original copy of the report of Oct. 7th 1921 and the file in which it was contained. This is the file which Mr. Lucas had with him the other day and the copy of the original report is on that file shown here.

Q--Tell me what this file relates to Mr. Gaby ?

A--The file referred to is entitled Memorandum to Commission 1921, Niagara Development No.5.

Q--Then does it contain the data upon which you base this memorandum of Oct 7th 1921 ?

A--No that is the answer to your question No. 16 in which you ask for the original copy of the report of Oct. 7th and the file within which it can be found. This is the file and the report is on the file.

Q--This file does not contain the data upon which the report is based ? A--No.

Q--Is there any other report in the same file dealing with the question of increased cost ?

A--I have not looked to see whether there is or not.

Q--Would that be the file upon/these reports would be kept ? A--Not only that it would have a memorandum to the Commission of increased cost and all expenditures; we would probably have numerous other files that would contain that information.

Q--These then relate entirely to the Chippawa ?

A--Yes and memorandum to the Commission in reference to it as far as it goes. It starts Oct. 12th 1921 or rather that is the end and I think the first memorandum is dated Jan. 3rd 1921.

Q--It apparently commences Jan. 21 and runs through to Oct. 12th of that year ? A--Yes.

Q--Would all the memorandum contained in this file be matters which you prepared in connection with the Chippawa Development for information of the Commission or members of the Commission ? A--I would not like to say all of them

are there; I would say the majority of them are there.

Q--Have you prepared other memorandum for the information of the Chairman or members of the Commission relating to the Chippawa Development during the period covered by this file and if so where would they appear ?

A--If they were made the copies would probably appear on this file.

Q--You were fairly sure that this file covered the memorandum you prepared for the information of the Commission or members of the Commission in connection with the Chippawa Development during the period to Oct. 1921 ?

A--I would not like to say so; I have not personally looked over the file or did I file the papers which are on it. I could not say definitely whether that is all the memorandum or not.

Q--Who would be able to speak of that ?

A--The filing clerk as to the memorandum which came into his hands.

Q--What I want to get at is this; have we the complete information for the period here, if not, where would the information be found ? A--In the files of the Commission.

Q--Is there any other file; I am not now dealing with your memorandum for the Chairman or members of the Commission, is there any other file ?

A--I do not know; I would have to investigate.

Q--You might investigate it and see if this is the whole file. A--All we did was to look up information necessary to answer the questions.

Q--Is the original letter or report referred to on the file inwhich it was filed in the Department of the Commission; you will see what I have been trying to get from you is the reports you made from time to time to the Commission in connection with this work that at all affected

either estimates or explanation of increases and so on and I understood you to say that there was one, that you had prepared a memorandum ? A--Yes.

Q--If they are on other files I would like to see them ?

A--That was not the form of the question as I understood it.

Q--I asked for all the files ? A--I did not understand it in that way. I have other questions to answer such as a copy of the report I made to the Commission on labour troubles.

Q--What is the next one ? A--No.2; you asked for the letter referred to in a letter transmitted to the municipalities Nov. 30th 1916.

Q--That is the Oct letter ? A--Yes, October 22nd; I find that was an error, it should have been Nov. 22nd, the letter of Mr. Pope's. It was atypographical error, the month.

Q--This is a letter from Mr. Pope of Nov. 22nd 1916 to Mr. Kent, the City Clerk of Hamilton :

" As requested by the Ontario Electric Association at a largely attended meeting held in Toronto yesterday, I herewith enclose you a copy of a short form of bylaw to be submitted to the electors of your municipality at the coming municipal elections, as to whether or not they are in favour of the municipalities in the Niagara district, through the Hydro Electric Commission of Ontario, taking the necessary steps to develop or acquire additional power as set out in the enclosed bylaw. This bylaw varies from the ordinary money or municipal bylaw inasmuch as it requires a first, second and third reading before being submitted to the ratepayers. As the time for the publication of the bylaw is

"short, it will require the early attention of your Council. If you will advise the date upon which your Council meet, arrangement will be made for a representative to be present with the necessary data and to make full explanation respecting the bylaw."

That was the communication according to your records which went from the Commission to the municipalities in the Niagara district in reference to this bylaw to generate ?

A--Yes, that along with the letter of Nov. 30th. (Letter dated Nov. 22nd, 1916 put in as part of Exhibit No. 46)

Q--Can you tell me whether pursuant to this statement that representatives would be sent with necessary data if representatives to attend the various municipal Council meetings to explain the matter did attend ?

A--Did they ?

Q--Yes. A--Certain engineers did appear before these municipalities.

Q--What was the data that they have furnished ?

A--That I have been unable to obtain definitely but they are looking up the file to see if they can get together a collection of the data and information used. It may have been only the information they had from the Ontario Municipal Electrical Association and the knowledge they had of the Niagara system.

THE CHAIRMAN: Would not a written statement be furnished by the Commission before sending this out ?

A--I do not think so; the Ontario Municipal Electrical Association did most of what I might call the explanatory part of it.

COMMISSIONER HANEY: The assistant engineers went out to assist what might be called propaganda ?

A--I would not call it propaganda; it was more or less explanation.

COMMISSIONER R.A. ROSS: You would have to be prepared with all sorts of answers ?

A--Yes a man must be familiar with what had gone before and know what the bylaw was in order to explain it.

HON. MR. ROWELL: Did you go out yourself ?

A--No I do not remembor attending any one meeting.

THE CHAIRMAN: Who would go out ?

A--Mr. Jefferys and his engineers.

COMMISSIONER HANEY: Mr.James ?

A--No Mr.James would not; his district is Eugenia.

HON. MR. ROWELL: When you say explaining the project, you mean the project you had recommended to the Government ?

A--Not only that but the ultimate object of the Commission in developing of the water powers at Niagara.

Q--What would they say about the ultimate object ?

A--The object would have been to develop a surplus water at Niagara. I think that was referred to pretty fully in an editorial which was prepared by the Ontario Municipal Electrical Association.

Q--Your reports of the statements you gave us the other day as I recall their terms stated that the whole available power was 6500 cubic feet per second ?

A--That was the estimate at that time as far as the then surplus was from the interpretation of the Act.

Q--If they gave any information these were the figures they would have ? A--No they went further than that, that any future diversion that may be laid as far as the International Boundary Treaty is concerned was also mentioned.

Q--Did you know whether they did that ?

A--I think you will find that statement treated editorially.

Q--I am asking about information given by the Hydro ?

A--That I cannot tell you offhand.

Q--Who would be the man who would know, Mr.Jeffery ?

A--He would probably know what he did, yes.

Q--Did they go out under his charge, those who went out ?

A--Under his direction yes.

THE CHAIRMAN: Is that Mr.R.T.Jeffery ?

A--Yes,

HON. MR. ROWELL: What is the next matter ?

A--I think No. 8 was another question.

Q--What was that Mr. Gaby ? A--The copy of Nov. 22nd 1916. You asked what report was made in connection with that.

Q--What report was that ? A--A report to the Commission by myself.

Q--What report was that Mr. Gaby ?

A--As I read it it was a report which is headed Queenston-Chippawa plant construction and refers to the investigation of the engineers on the operation of a modern device of earth and rock moving machinery.

Q--Have you got a copy of the report ?

A--Yes I was just looking it over.

THE CHAIRMAN: Mr. Rowell have you got a copy of the editorial to which Mr. Gaby refers ?

HON. MR. ROWELL: You took that file back ?

A--Yes.

Q--What is next ? A--That is the report. We went into the details urging the Commission to get the necessary Order-in- Council so the matter could be gone on it; that is not the whole report, those are the Minutes of the meeting. Report is made as of Nov. 22nd 1916. These other things are not relevant at all. I would not like to disturb this file but we can have a copy made.

EXHIBIT NO. 50: Filed by : Copy of report of Nov. 22,
: Hon. Mr. Rowell : 1916.
: April 4, :
: 1923, :

WITNESS: No, 9 we might take next. You asked with reference to a Minute of a meeting of Oct. 8, 1920. You asked what was referred in the Minutes in which I recommended certain accounts to be paid.

Q--October 8th ? A--Probably Oct. 12th it was referred to.

Q--What is the reference ? A--^{Hugh} L.Cooper's account asking for a letter I had sent to Mr. Hugh L.Cooper.

Q--That was the payment of his account ? A--Yes.

Q--There is nothing dealing with the subject matter of the report ? A--Not at all no. Then again you asked for a report in item No. 11 submitted Jan. 11th; report is already submitted.

Q--What year ? A--1922.

Q--January 11th ? A--Minute 1919, January 11th 1922. That is the same answer that has been made and the exhibit is also in.

Q--That is the one you produced before ?

A--Yes there is no difference, no change. I wanted to make sure whether it is the report referred to. Another question No. 17, you asked when we first considered the rush schedule. That was the date on which the contract made and I think it was Dec. 27th 1920.

Q--The date which contract was made ?

A--The contract made for the dredge cyclone for the operation in the earth section of the canal.

Q--Up to that time what had been your date for completion ?

A--Nov. 1st.

THE CHAIRMAN: What year ?

A--1921.

HON. MR. ROWELL: And then in Dec. 1920 you decided to adopt what you have described as the rush schedule in order to complete it by September first ?

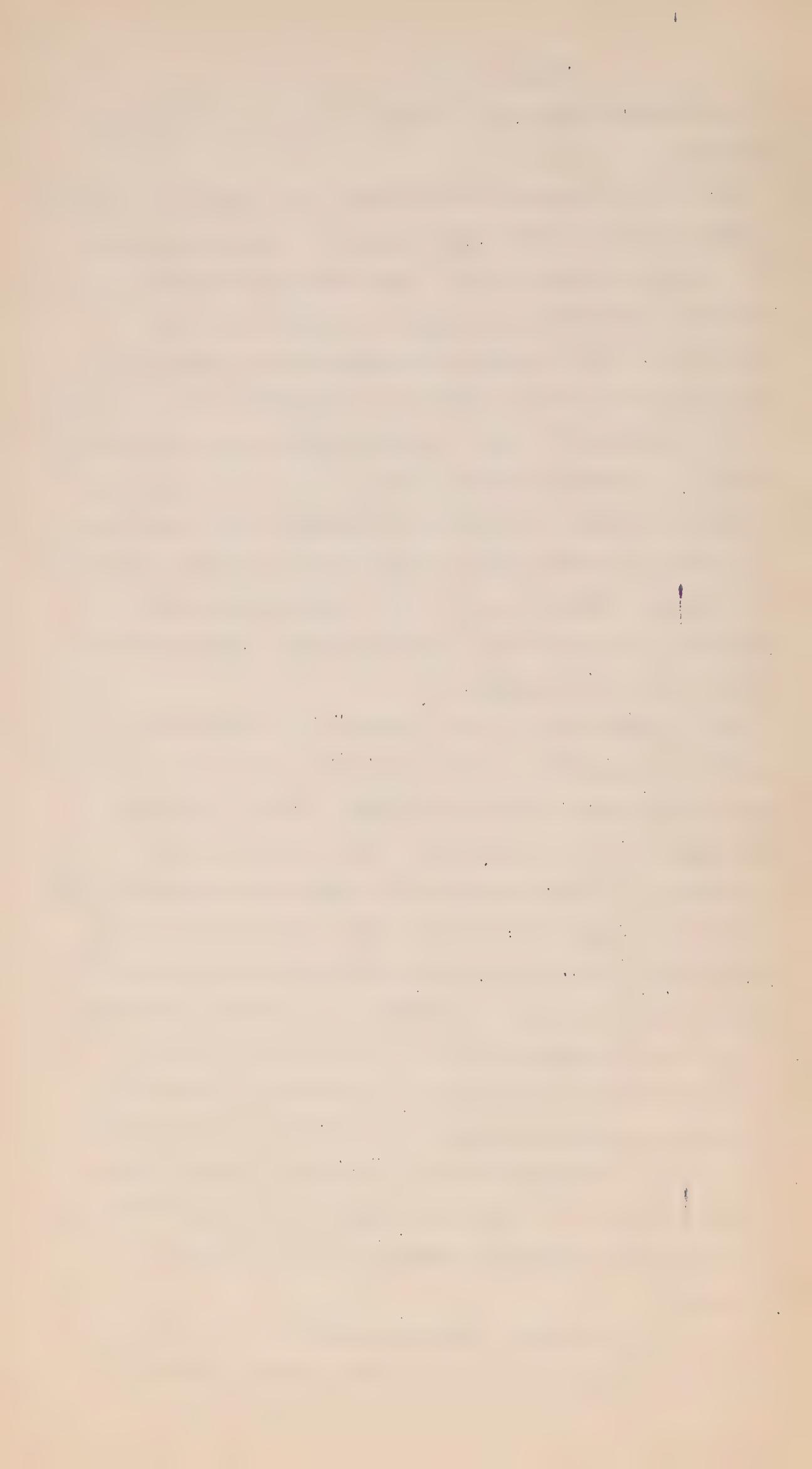
A--Yes, that is as near as I can recollect, some date

around December 27th, the meeting had been a few days previous.

Q-- We have not been able to locate any minute in reference to the adoption of the rush schedule ; did you report to the Board in favor of it ? A-- I think the matter was seriously discussed at a number of meetings by the Commission. Its object was paramount in the minds of the Commissioners as to the date we would complete the work and it was discussed at a great many meetings by the Commission. There are a number of minutes which have no reference to these discussions but this was discussed by the Commission. I would say from the time we received the report of Stuart & Krumbaugh in October up till the time the Commission decided to enter into the contract for the handling of the dredge this was discussed.

Q-- Then what was the next matter ? A-- Number 10, you asked as I remember in the minute of September, for the progress reports of July and August. It is practically impossible for us to reproduce these progress reports. In addition to the Niagara Development, the progress reports go into the Commission in that form. This one is one of those which went in and covers miscellaneous details of all work carried on by the Commission. On that report being noted by the Commission it is returned to the Filing Department and they split it up and take the individual items and reports contained in this folder and distribute that through the files of the Commission under the various classes of work, so this practically means to reproduce the progress report that was submitted to the Commission in September.

Q-- We only want the progress report relating to the Chippawa Development, is that in the Chippawa file ?



A-- Yes.

Q-- That of course is what I wanted ? A-- I thought that is what you wanted and I wanted to explain how these are handled ; this would be the progress report in detail.

Q-- The Minute shows a progress report in connection with the Chippawa was submitted.

THE CHAIRMAN-- Wouldn't you summarize it ?

A-- At that time we did not ; now we summarize it and it takes about twenty sheets to accomplish that, twenty of these sheets. At that time we submitted it in that way and the Commission would take the file and if there was anything they wanted to note they would note it as the case may be. The file was kept available for approximately a week and it was distributed through the files.

, THE CHAIRMAN-- How would you expect the members of the Commission to go through a file like that ? A-- It is simply a question of noting. It is on the different sheets the progress made by each of the respective parts of the work, and if they are not wanted they can go right to the files, and if ^{there} is any information required the information can be got from the time of these reports for the last month - it is usually a month which they have before them, and in addition to that there are the financial reports which I have not brought with me today as I did not think it was of importance. The Commission can get information regarding each job in detail from month to month for each year and that is the thing they are mostly interested in. This is just telling the number of yards taken out, the percentage of work done here and the amount of material bought and labor. This is the information that is of value to the staff, but it is very difficult for anyone, who knowing the conditions and having an average for a period to get that average from such reports.

The progress reports of the Queenston-Chippawa Development happened to be my own report and comes in to me monthly and that is for the one year, 1921. That is the financial end only showing the distribution, that is one year and that is a detailed report. There are twelve copies of the report.

HON. MR. ROWELL-- This deals with the distribution of the cost, the monthly cost ? A-- Yes.

Q-- Have you got a monthly report ; did you get a monthly report from Niagara from the engineer in charge ?

A-- Yes, I was coming to that point. This shows what we got. This comes from Niagara as far as the Accounting Department is concerned ; that is my personal report in connection with the distribution as far as money is concerned made by the Niagara Development distributed into six or seven hundred different divisions of the work orders. In addition to that we got a weekly report which shows daily the number of men that are engaged on the job from time to time by blue prints which are brought up to date each week. Then we get also a schedule that sets out the different classes of work and shows the progress that has been made, showing a massed diagram of earth and rock. That blue print is shown, showing where the progress is below or above the schedule that has been set.

EXHIBIT NO. 51 : Filed by : Daily report
: Hon. Mr. Rowell :
: April 4th, 1923 :

Q/- The first sheet of exhibit No. 51 is ?

A-- Blue prints numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11, comprising eleven blue prints showing the progress of the various parts of the work on the Queenston-Chippawa Development. No. 1 shows the number of men engaged ;

No. 2: massed diagram of rock and earth excavation showing progress relative to schedule ; No. 3 : massed diagram of rock excavation showing progress relative to schedule; No. 4 : massed diagram of earth excavation showing progress relative to schedule; No. 5 : a progress chart of total concrete in canal showing daily production, and showing progress relative to the schedule in yards; No. 6: shows the progress chart of concrete in Power House ; same explanation as No. 5. No. 7 shows the ^{concrete} in greenhouse, progress chart; No. 8 : shows the concrete lining in canal, progress chart ; No. 9 : shows the concrete lining in canal, station 322 plus 5 to 348 plus 54; No. 10 : progress report of canal lining to 165 plus 40; No. 11 : progress report of concrete lining in curves. That was one set of blue prints that was dealt with.

Q-- From that set of blue prints you are able to tell from week to week whether the work was keeping pace with your scheduled time for doing the work on the canal ?

A-- Yes; from the time that this commences until it was discontinued, whatever date it commenced on the work ; this report was only for 1921.

Q-- You kept reports of this character throughout ?

A-- When the work arrived at the stage where the schedule had been reached and so on, then the progress commenced. That is, we had to establish a schedule for the work to be done and these progress reports were submitted periodically.

THE CHAIRMAN -- Wouldn't you have a schedule from the beginning, you had a fixed date ? A-- I don't know just in what form these schedules were. We had certainly some form of schedule; otherwise we would not have been able to lay out the plan. We had schedules, but these were changed from time to time as conditions required. For instance, this schedule of 1921 would be based on this weekly report of 1921.

It would be based on the schedule established in the fall of 1920. That was the schedule established by the Stuart and Kerbaugh engineers and the Commission's engineers.

Q-- That would be the schedule to complete by 1st September 1921 .

COMMISSIONER HANLY -- Did you have monthly estimates ?

A-- Yes. Well then, we had a progress report which was a daily report, a daily report which gave the following information, and this is a report from the engineers in addition to the progress report itself by which we checked the work in the same manner as engineers would check a contractor's work. They give progress reports copies of which were forwarded to the office and these covered the different works carried on by the field branch. Then it also give the work carried on by the general staff of the office and the number of men engaged from the start ; also an engineer's report on the construction of the various divisions of the work starting with the river section, etc. The assistant engineer's report on canal concrete plans, buildings, and in general the respective work carried on telling as near as they could the percentage of work that had been done, and this covered from station to station and it also gave any other explanations which it was thought necessary to give. This file of reports which is called field progress reports, numbered 4-2-8, are sample field reports. These have been picked haphazard out of files, and this one runs to April 30th, 1921, and is picked out of the files as a sample of progress reports.

Q-- Now then, your estimates ? A-- We will come to that in a minute. I also had daily reports from the Niagara job which were prepared by my secretary, and taken from more or less detail reports showing the general progress that was being made on various parts of the work, showing the number

of yards taken out on the previous day and telling the percentage it was below or above schedule as the case may be, and the equipment that was working and what amount of work it had done. Earth would be given on July 4th, 1921, 2327 yards or 36 percent below schedule, rock 815 yards, 1109 yards or one percent below schedule, making the total excavation two percent below schedule.

Q-- You were able to keep track from week to week whether they were above or below schedule on all these branches of the work ? A-- Yes, they varied from time to time, sometimes above and sometimes below.

Q-- The daily reports would be corrected as you got the weekly reports, and then the monthly reports would be corrected again ? A-- Yes, the daily ones are more or less a close estimate of what is going on at the time, based on predetermined estimate, averages for certain yards and quantities handled, or some other simple way of determining the yardage that would be removed every week; and taking it over a month or longer periods in making the corrections you would cover any possible errors above or below which might have taken place.

COMMISSIONER R. A. ROSS -- Your final yardage would be checked up with instruments ?

A-- Yes.

COMMISSIONER: J. A. ROSS -- You would come to a trial balance once a month, you would make your corrections by the month to arrive at a balance ? A-- Yes. From the balance in connection with that as nearly as we possibly could ; that was my private secretary's report to myself. We also had the engineer's report which came to me from the Chief Engineer, which showed the portion of each individual item of work entered. For instance, the different types of

of shovels for each day of the month and I got these reports daily. It gave each day a graphical record of the schedule and the actual work done by the shovel during the day, and gave me in a general way the daily output and a percentage as to whether it was above or below the schedule in these reports. In addition there was a tabulated sheet they called "shovel output record" which was submitted giving details of the output of each of the shovels showing the schedule to date from a certain date, excavation to date from a certain date, the difference below or above , and the canal excavation in rock and canal excavation in earth and giving remarks, reasons for any delays during the day on account of accidents, repairs, etc. These are the daily reports sent through for the various shovels and also the concrete, for the work on the power house, the canal curves, the canal transitions, the intake and the G.T.R. bridge. In addition to that, there would be other special reports ; this was a daily report in connection with that.

THE CHAIRMAN -- Mr. Gaby, have all reports on construction been submitted to Mr. Francis ? A-- I think he has been summarizing these.

Q-- You have none except those that have been placed at his disposal ? A-- Yes, everything we had. Those are simply interim reports ; he has the final reports as to the final estimates, and he has got the progress charts that are complete up to date in reference to this particular work showing how the work proceeded from time to time.

COMMISSIONER J. A. ROSS -- All these showed how you were going from time to time ? A-- Yes.

Q-- There was nothing final about it ? A-- No, simply progress reports to guide us as to how the work was going from time to time and to check up with our schedules and to take what steps as were necessary. If we were falling

down on the one part we could make an effort to improve that to come up to the schedule . In addition to that we had the Niagara Development reports. This report was sent in monthly to the engineer and it covered all the operations of the particular plant showing a record of the shovels for the previous month and the month under consideration.

HON. MR. ROWELL -- Did that show you the unit cost each month of the work being done ? A-- That showed the unit cost of particular items of work such as the drilling in Forebay, blasting operations, etc., cost of excavation as far as the shovels were concerned ; that is all shown in these shovel records and in different records. We also had various estimated costs, for instance, like excavation showing what was done each month, labor charges, material charges, drilling, wages, blasting charges and charges for lumber and material, and plant rental chargeable to the respective shovels. It showed the cost chargeable to the particular unit and also the number of yards of material or work done by that respective piece of equipment in the unit cost, and that was charged against that piece of equipment for that particular month and the previous month.

Q-- Did you have a summary of that to give you the total each month ? A-- Just one minute, Mr. Rowell. That carried on not only for the units, but carried on for the scaling and mucking operations, power house, screen house, intake , canal miscellaneous, canal concrete, railway bridges, roadways, crushed stone and sand, power, light and telephone overheads, and recapitulation.

Q-- Did that give you at the end of each month the figures which would enable you to make a comparison with your estimated cost ?

A-- No, I would not say it would because those things

will vary up and down from month to month ; that is, you cannot take an average of a month and check that up with the estimate, as I understand you to say, to carry out the work. Some months are low and some months high, depending on the conditions under which we are operating.

THE CHAIRMAN -- If it appears on the cost ?

A-- It will vary on the whole thing. Here is also records of the concrete output in the same form as these shovel outputs for a month. We also tried to keep ourselves informed by graphical records of the general progress which is shown here. The graphical records show percentages up to certain dates as far as the work is concerned.

Q-- It shows the percentage completed from time to time of the different grades of work ? A-- Yes, as far as the canal is concerned ; that is only the canal section. This is the sheet showing the drilling and is also a progress profile, and we have other progress profiles showing the work as it proceeded.

Q--How would you describe this set of plans ?

A--I would call it simply graphical progress chart. I suppose one of them will do you.

EXHIBIT No. 52. : Filed by : Graphicl progress chart.
: Hon. Mr. :
: Rowell, :
: Apr. 4, 1923. :

Q--Then how would you describe that plan ?

A--This is a plan of the channelling and drilling progress profiles. That simply shows the work that was done in channelling and drilling and excavation for different years from 1918 to 1921, which is shown by the colours on the plan.

EXHIBIT No. 53. : Filed by Hon. : Channelling and drilling
: Mr. Rowell, : progress profile, for
: Apr. 4, 1923. : years 1918-21.

EXHIBIT No. 54. : Filed by Hon. : Cost Report for June,
: Mr. Rowell, : 1921.
: Apr. 4, 1923. :

Q--Now, what information, if any, did you lack, Mr. Gaby, to enable you to follow from month to month the relation of cost to estimate ? A--The progress that was going to be made in the future, as far as the particular equipments were concerned; and that had to be estimated.

Q--Did you not have before you each month such information as enabled you to compare the unit cost in your estimate with the actual unit cost ? A--Not the ultimate, Mr. Rowell.

Q--I am not dealing with the ultimate, but I am dealing with the conditions from month to month. You have a certain unit cost in your estimate ? A--Yes.

Q--And your monthly returns come in and they give you the information which enables you to say what your unit cost of the actual work is. That is correct ? A--Yes, as far as the actual work done is concerned, each month it was recorded and the unit cost was prepared, which could be checked up with any unit cost which you may have had, as to whether you are high or low.

Q--Then you were able every month of this work to compare the unit cost as actually reported on the ground with the unit cost contained in your estimate ? A--From the time those unit cost sheets commenced.

Q--Can you tell me when the unit cost sheets commenced ? A--I would say very soon after the work commenced, that is the actual construction of the Canal, as far as shovel operations are concerned.

Q--Then, from the date of the actual construction of the Canal shovel operations, up to the date of its completion, you received monthly reports from Niagara from which you were able to compare how the actual cost of doing the work in each month compared with your estimated cost on the total work for the same class of work ? A--That you can answer yes and no, for the simple reason that you may have a very high cost for taking out a very small quantity of material, and that is no criterion as to what your costs are going to be, as far as excavation is concerned. I mean that you may have a cost of \$5.00 a yard for one month, and the next month have a cost of fifty cents, depending on how the charges for overhead, and so on, and the quantities taken out by that particular shovel, and things of that kind. There is no possibility, until you have a considerable part of your work done, to see, unless that is the whole of your unit cost.

for instance, you have to construct in the beginning of your operations a complete railway, and you haven't excavated a single yard of material, and yet a large per cent of your cost of doing that work has already been expended in the construction of the railway and the preparation of the plant, and the carrying on of things of that kind.

Q--Does that whole expenditure appear in the unit cost of the first month, say ? A--No, it does not appear in the first month's unit cost, but as soon as that shovel comes into operation it is usually a very large item in the earlier stages of the operation of that equipment, depending upon how much earth or whatever it is that equipment will take up.

COMMISSIONER R.A. ROSS: I think what you are trying to show, Mr. Gaby, is that your unit costs which you have there are simply labour and material which without question are chargeable to a particular distribution ? A--Yes.

Q--Your overhead on the job is not in there, and your overhead in Toronto here is not in there, your interest is not in there, and there are fifty things that are not in there; your transportation is not in there ; so that what you have there is really a labour and material cost which can be distributed to each particular item ? A--Yes, in order to make a check of your estimates you have to take the cost that is before you, determine the amount of work that has already been done, estimate what work has to be done in the future, and then estimate from that progress which has been made on the respective units here as to the progress in the future on those different units; and then apply that to get an estimate which you would be able to check with the estimates which have gone before for the same work.

THE CHAIRMAN: Wouldn't you follow the same system as a contractor would have if he had the job? A--We do.

A--Because it would be essential, where a contractor had to get a certain sum for a certain work, to know month by month whether it was costing him more than he was to get for the work? A--Even a contractor does not know that. For instance, taking the case of the contract for the intake, two months before he completed that, the contractor told me he believed he was well within his estimates and that he would carry out the work on the unit cost which he had tendered on and which were in his contract. When he had completed, he was \$164,000 out, which he did not know although he had had monthly reports.

COMMISSIONER R.A. ROSS: Your items could only be distributed after you had got the whole thing completed and you knew the number of train miles which were used, for instance, on the haulage of earth and rock and distributed that over the whole amount of rock and earth taken out?

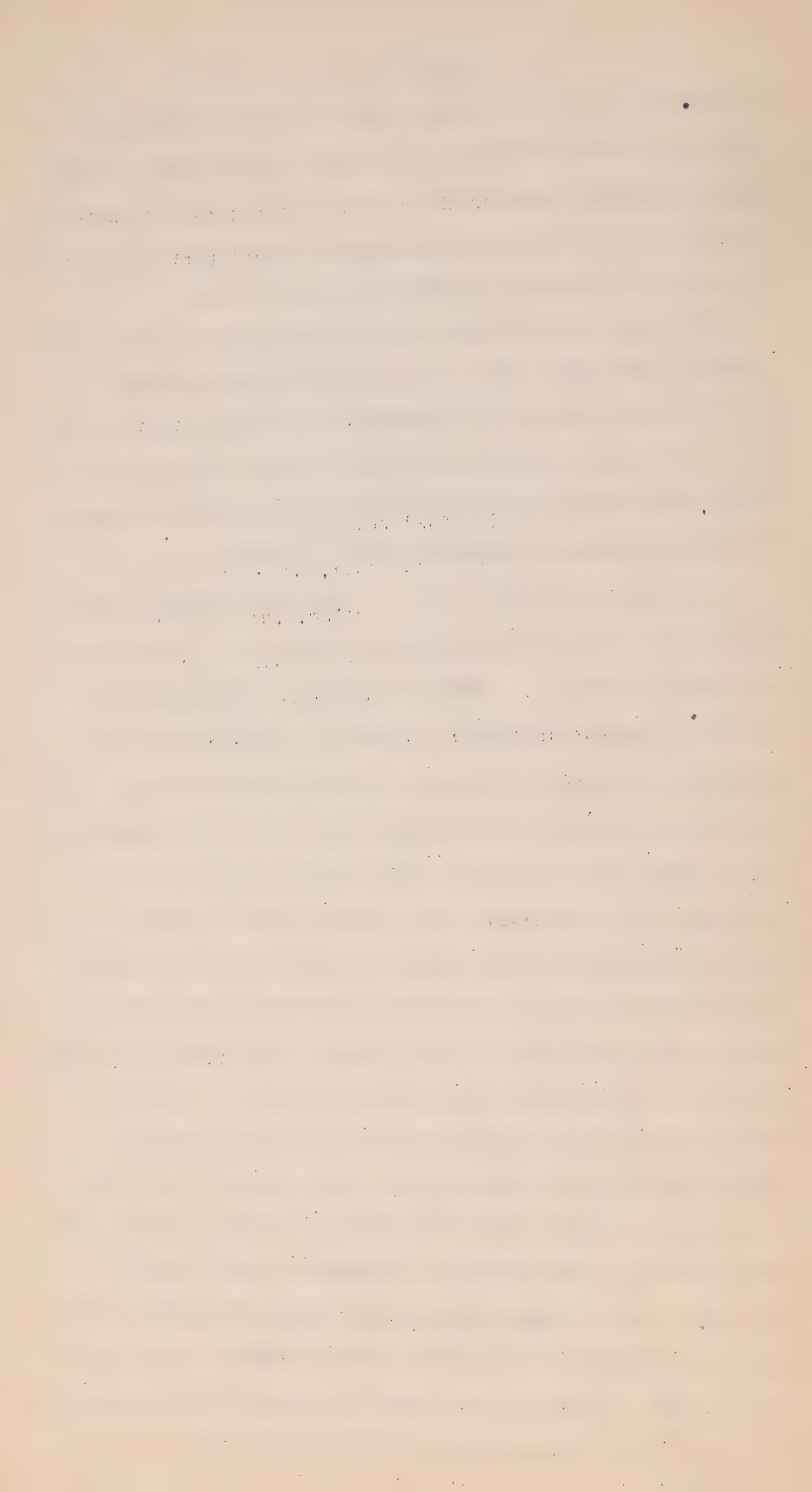
A--That is so.

THE CHAIRMAN: Wouldn't the contractor, though, make an estimate of what proportion of that estimate should be charged up to the unit cost? A--You see, Mr. Gregory, you cannot do that in the early part of the construction. If you do segregate your unit costs in some way that you get your unit costs out there you could probably come to that conclusion. We had those for comparative data, to see how the results were going from month to month, and see how our costs compared from month to month in this operation. In other words you cannot compare the final unit costs for the construction of that work with the unit costs which we get in that detail, because that only refers to a part of

unit costs. But you could set out a shhedule, and we did, as far as that was concerned, as near as you could depending upon how the work was going; but you have always to take into consideration the future part of the work and estimate what your progress is going to be.

For instance, our unit costs in the case of this 1920 schedule were based upon each particular shovel doing a certain amount of work in earth and a certain amount of work in rock; and even then you could not tell how our costs were coming out in total until you had commenced to operate in rock with those particular kinds of shovels.

As a matter of fact, in 1920-21 schedule, those shovels did not start to operate in rock, as I recollect it, until May or June, 1921; then when we found out how they were going to operate, we were in a position to tell how they were going to operate. We had electric shovels in particular classes of rock, and we knew what they would do, and we based our estimate on the progress made by those shovels in the particular class of rock that we were in, from the Whirlpool to the Fombay; and they would do it day in and day out, subject to repairs and other things which would come in accidentally that we could not avoid, although we had to estimate an average amount for that. Then, we anticipated our steam shovels would carry out the same progress as the electric shovels. As a matter of fact they could operate faster than the electric shovels, that is, you could pick up a load faster, as far as the steam shovel was concerned, but we found, when we put those shovels into rock, that the delays due to repairs were tremendous, a great many more delays, a greater percentage of delays on the steamshovels than there were on the electric shovels; and that



threw our calculations out, as far as costs and that were concerned.

THE CHAIRMAN: Of course, contractors have had shovels working on rock in other places ? A--Not of that magnitude. We had information as to what they were doing, but as far as the rock excavations which we were entering into were concerned, we only had to pass our judgment on our experience as far as these shovels were used.

COMMISSIONER R:A. ROSS: Where were electric shovels used before ? A--Not in any place of magnitude.

THE CHAIRMAN: Steam shovels had been used before ? A--Not with such a lift as we had there. We had ninety-foot booms on those, and we were lifting sixty to seventy-two feet from the bottom of that canal; and we had submarine drilling of fifty or sixty feet average; something new as far as shovel operations were concerned. As a matter of fact our electric shovels did very much better than our steam shovels.

Our engineers estimated that we would get a certain output from those steam shovels, and we would get a certain output from the electric shovels, both in earth and rock. The steam shovels did not fall so far behind in earth, as capacity is concerned, but their costs of operation were much higher than the electric shovel. I think the costs instead of some seventy or eighty cents ran to about \$1.10 for the steam shovel in earth.

As far as our individual shovel is concerned, we could see and we checked, as far as that part is concerned, with our actual estimate; but to determine as to whether we are going to get that earth or rock out on our estimated quantities, we would have to know what our future operations

of those shovels were, and we had merely to estimate on the future operations to check our estimates.

COMMISSIONER J.A. ROSS: So that it was largely theoretical? A--Up to the time that they went into actual operation.

Q--As I understand it, you did not start charging any overhead capital costs or cost of the railway or other things, until your shovel digging was pretty well done? A--No.

Q--How could you start spreading your railway costs at the start? A--You could not at the start.

Q--I am not clear at what point you started to spread your charges, when you felt reasonably clear that the charge would be so much against that shovel? A--When we had a small percentage of the work done. Take rock excavation, for instance. In 1921 canal rock on this item here we had included in these transportation and disposal, that is the transportation of trucks and so on as used by this particular shovel and chargeable to that shovel, the excavation and loading, that would be the actual direct charges for excavation, loading, labour and material; and then there were the actual drilling operations which went before to loosen the rock; the blasting was the same thing, the Superintendent and the plant rental. Those were the detail figures which entered into those unit cost figures which we had for comparative costs. This particular report is in May, 1921. I do not remember the date when we started the cost data reports in this form; I think it must have been sometime in 1919 or 1920. I could look up the exact date.

Q-- My thought is this, at what point were you fairly sure of the cost of excavating per yard on your shovels, at the start or when you were half done with the job or when you

finished? You say a good many charges had to be put in there, a very large charge for railroad operation and capital cost. If you di_dn't spread your charges until you finished, then you did not know what the cost of the job was going to be until it was done? --We did know before. Very soon after we started we set out a schedule, that is we started, as near as we could estimate, the percentage of the railway that should enter into that. You could not charge the whole thing because that would not be feasible. For instance we constructed eighty-eight miles of railway and put \$17,000,000 of plant in there. You would have to estimate what share of that is chargeable to that particular work. In other words you split that \$17,000,000 up into four million yards of work, the estimated quantity of work you were going to do, and then you started charging to that approximately that amount per yard.

COMMISSIONER R.A. ROSS: We know that contractors take contracts and make and lose money, but they do have some method of keeping track of the work as they go along. They put down their labour and material items which are unquestionable and undoubtedly attributable to each section of the work, to that work. They divide that by the number of yards they have shifted, and they get a price for labour and material for that day's work; then they conclude that their transportation and interest charges and that sort of thing are going to be so many hundreds of thousands of dollars for the period of the work, and they divide that by the number of cubic yards of stuff that they expect to take out, which gives them a cost for overhead per cubic yard. But the trouble with that, if you applied that monthly and weekly, you would find at the start, when you were taking out very little, and at the end

when you were taking out very little, because you have to consider and expect the low loads on your plant; you would have an entirely misleading set of costs, that is to say, at the start when you were starting your machinery and getting things into shape your costs would be abnormally high, and when you were in the middle of the job your costs would be low, and they would increase again towards the end of the job. So that, as far as I have ever found out from other contractors as well as in my own experience, they only know when they get to the end of the job and put the whole thing together into one sum and divide it by the amount extracted, and then they had a figure which was applicable to the whole job ? A--I think we tried to do it a little more refined than that.

Q--Of course contractors do make allowances, and so on, but it is only a guess ? A--Yes, that is all.

COMMISSIONER H.A. ROSS: Then the only conclusion I could come to is that you did not know what your actual shovel costs were until you had got done ?

A--We knew the actual cost of everything that entered into the shovel records. For instance, as Mr. Ross has put it, we knew the direct charges, that is labour and material; then we had a large number of items which we call overheads, such as engineering, head office engineering and field office engineering; interest charges; administration charges. There is a list of them all, about twenty or thirty different items which were called overhead charges, which included also plant charges; also charges for transportation and things of that kind. Then we had a direct charge, as I have stated, that went into our monthly cost for labour and material, for instance, for drilling and blasting, channelling, and those

different items. That was direct labour and material. Then a certain proportion of our overheads for transportation, and our plant charges, and things like that, are written off, and depreciation of plant was written off into this job; taking into consideration and estimating the amount chargeable to the work done, as far as that particular shovel was concerned.

In some places it was on a time basis at so much a month. For instance, you would say a shovel was in operation for one month, and depreciation for that year, so much, and we charge so much depreciation against that and get as near as we can, and there would be so much against that shovel for interest charges. And there would be transportation charges, and we would have to apportion that in some arbitrary way and get as near as we possibly could to get the amount of transportation chargeable to that shovel or the work that that shovel was doing; and the telephone, air, and the auxiliary services, and all that kind of thing, had to be dealt with by an arbitrary distribution, which was estimated on the probable output in accordance with the schedule for that shovel for the future. Then we would check that up against that particular class of work. That would give us a unit cost which would be either above or below.

Q--I can see that you did it as efficiently as it could be done, but I cannot see that you could get actual cost until it was done.

A--Oh, no, we could not get the actual cost except for the labour and material which entered into that work, and we had to estimate the charges for air and everything else chargeable to that piece of work. In other words, it was an estimate on overhead charges which had to be estimated until the time we were completed.

COMMISSIONER R.A. ROSS: Then, as far as that was concerned, you were making an educated guess ? A--Yes, sir. You can take in rock, for instance, the Bucyrus, No. E.S. #6, in the canal. That is for earth. The total charges were sixty-three cents per yard in the particular month, for taking it out. The labour charges were fifteen cents, and the material charges were eight cents; the twenty-three cents out of the total were direct charges. The other charges were superintendence, that was distributed over the whole work; some transportation, some depending upon how that work was going on, it was only two cents; plant rental was a direct charge on that piece of machinery plus the other plant rental which would be subsidiary to this Bucyrus No. 6, was seven cents. The big item was fourteen cents labour on transportation and disposal, conductors and motormen, signal men, and so on on transportation, which we had estimated should be chargeable to that particular piece of work. That was the best estimate we could make. It was distributed amongst a very large number of items. That distribution was drawn on sheets. For instance, a man's time came in with a large number of distributions on it, both for time and material, that was distributed on sheets, and distributed again to the various parts of the shovel, which is a very involved cost data system.

Q--Then, when you have done that, you have what might be called a contractor's cost on the work, to which has to be added all your overhead charges in Toronto, all your interest charges, all your maintenance cost, and the rest of it, and distributed then to the rest of the charges ? A--Yes. That is, we have to assume at the beginning, for instance, we have administration charges on the particular classes of work, transportation and so on, and distribute those as well

as we can. Overhead, office, administration and accounting, and so on, will be chargeable into that particular item. It is a very involved, detailed analysis of accounts, and to study from time to time whether these distribution charges are accurate. In other words we try as far as we can to reproduce here the cost monthly of the actual work distributed in those items, and the overheads we have to distribute in the best way we possibly can. In other words, unless you had your estimated unit costs that are shown in the main estimate distributed in the same way as this is, you would have no comparison; but you do have a comparison from month to month and week to week as near as you can make it, of carrying on that work.

HON. MR. ROWELL: In making up your original estimate of unit cost, you consider all these elements which you have now referred to, in arriving at your estimated unit cost, do you not?

A--In a general way, yes. Not probably in detail. You have to probably take into consideration, and we did in trying to arrive at a comparison between steam and electric operation, in our 1917 report; we tried to approximate as near as we could the cost of labour and material and so on to do a certain piece of work with a given shovel. We tried to do that in our early days. In making up your general estimate of the cost of the work on the canal, to illustrate certain unit costs for rock and for earth excavation? A--Yes.

Q--In arriving at your unit costs for either earth or rock, you do have to take into account all the factors you have mentioned? A--As an estimate, yes.

Q--As I understand it, your estimate per cubic yard, of

earth or rock excavation is an estimate which includes all these items which you have mentioned ? A--It includes all those items.

Q--Now then, in arriving at the amount per cubic yard you do divide and allow a certain amount for the several important items, you do not just jump at it, but you work it out in proportion to the estimate which you placed upon labour and material costs ? A--To the best of our judgment.

Q--And the judgment which you placed on these other factors ?

A--As a rule the overheads are put in, engineering ten per cent, and so much for superintendence and engineering, and interest charges; those are put in as percentages at the end; but the other items of labour and material, where the information is available, are put in in that way and checked up probably in total with records that have gone before with labour conditions of a somewhat similar kind.

Q--Take your estimates, both numbers 1 and 2. They are based on certain unit costs, as far as the canal is concerned, for rock and earth excavation, and then at the end you have a certain percentage for engineering and contingencies, and a certain percentage for interest during construction. Your unit costs, therefore, as I understand it, cover all the items that go into the costs except engineering, contingencies and interest during construction. Am I correct in that ?

A--Yes.

Q--Then you start with your labour and material, and you take into consideration these very factors, transportation, and so on, and get at the amount per cubic yard which you estimate ? A--Yes.

Q--Then when you get in your cost returns, are you not able to compare at least that fixed factor of labour and material between your estimate and your actual cost of doing the work ?

A--Yes, if our unit cost in the first place is analysed in

that way , we are.

COMMISSIONER R.A. ROSS: As a matter of fact, did you analyse it in that way ? What is usually done, as far as I know, is this, your judgment and knowledge of the cost of doing the work obtained in your own business, with the knowledge of the cost, for instance, that other contractors have, are taken and you have a pretty close idea of what it is going to cost you per foot to do the work; and you say, after due consideration of all the items surrounding it, that that looks like a fair figure to use, and, say, we will use a dollar per yard for rock. It is a matter of judgment and is not a matter of the dissection into the items which are in it at all. When you say a dollar, that is supposed to include all the items that are in it, but it is not laid out in the way in which your final figures are laid out ?

A--You are correct, in one and two; but I think Mr. Rowell is right in saying that in 1917, in the comparison between steam and electric shovels, we tried to make the estimates.

Q--That was something about which neither you nor any other contractor knew anything, but you would put down in figures what you thought was a fair thing for moving, drilling, or blasting ? A--Based upon experience, and so on, and information that has gone before. That is numbers 1 and 2 estimates were prepared that way. And in 1917, a detailed study was made of the costs of certain of our items of operation, such as electric shovels compared with steam shovels; and we arrived at a certain figure, and took a round figure, after we got that, based upon our judgment and also from the experience of contractors in that class of work, such as Hugh L. Cooper, who was one, Sanderson Porter was another; the Construction Company in New York, the Underground or some Foundation, Company. We got their actual reports as to what they would estimate the cost of taking out rock.

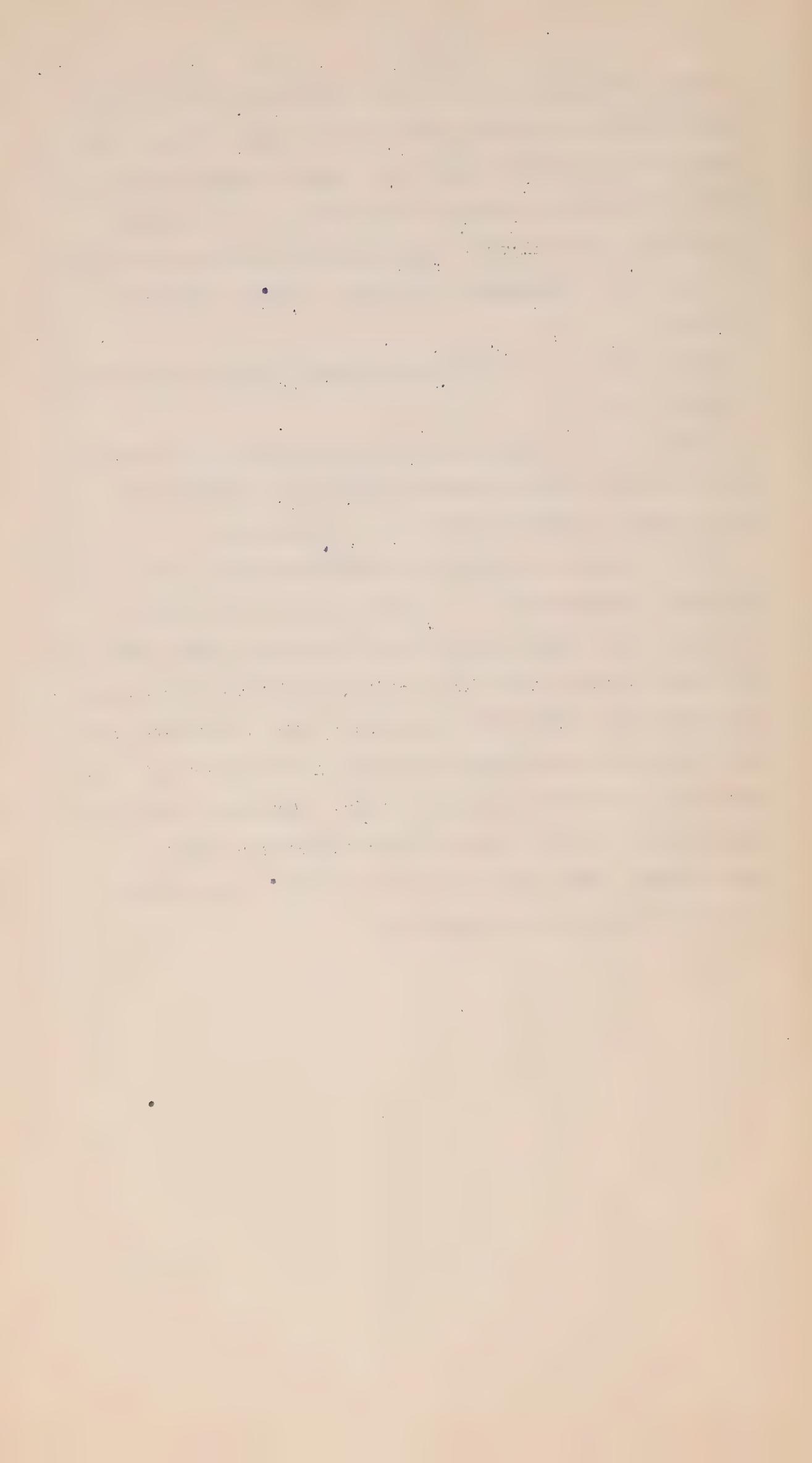
I think that was the particular item which we had under consideration, rock and earth in that canal. Those were the items that they figured on. Then we made a study of the possibility of reducing those costs by electrical operation, and analysing those costs as best we could came to a certain conclusion, and used a figure somewhere in between.

Q--As to that, in electric shovels you were pioneering ?

A--Yes, sir.

Q--And, if you were making another canal in the future, you would have those figures before you, which would be better than any other figures ? A--Yes, sir.

Q--And any other contractor undertaking such a work would use your experience ? A--Yes and he would take an average of the cost per cubic yard based on those conditions. The thing varies from time to time, as far as your operations are concerned. You have to estimate into the future as to what kind of a plant you have to use, and you do not know until you get on the job what it is. You keep changing it from time to time, to meet the conditions as they materialize. You can only carry out your best judgment, as far as the work is concerned.



HON. MR. ROWELL: I have before me, Mr. Gaby, in your General Report No. 16, copy No. 4, a description and analysis of the cost of the operating excavation plant, including the railroad. A-- Yes.

Q-- And I find here an analysis of the earth and rock excavation divided into certain items, making up the total; can you tell me what that refers to? A-- That refers to ^acomparison of the steam and electric operation that we had been carrying on, as near as we possibly could make an estimate of the work to be done. We had received information from certain contractors and tried to estimate as best we could the distribution of the cost of shovel operation as between those various items shown here, such as, shovels, locomotives, cars, track, materials, dump expenses, and overhead, based on the analysis that went before. I do not remember that in detail, I do not suppose I have looked at it since 1917.

HON. MR. ROWELL: That is as far as we can go tonight, Mr. Chairman; I will continue with Mr. Gaby in the morning. The next point we will discuss is with regard to the Ontario Power Company.

THE CHAIRMAN: We will adjourn until 10.30 tomorrow.

(Proceedings stand adjourned at 4.55 p.m. Wednesday, April 4th, 1923, until Thursday April 5th, 1923, at 10.30 A.M.)

